

Appl. No. 09/887,993
Amndt. dated September 11, 2003
Reply to Office Action of July 21, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A liquid cooler comprising:

a hollow tubing having an outer wall and a hollow ~~circular~~ inner portion, said outer wall having a ~~circular~~ inner wall portion; and

~~a first structure contained within said hollow tubing, said first structure functioning to limit the temperature rise on said outer wall by distorting the laminar flow of a fluid flowing along a center portion of said hollow circular inner portion, said center portion defined by a reference line located equidistant from said circular inner wall portion of said outer wall.~~

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~~a structure disposed along a center portion within said hollow tubing, said structure providing a stationary surface for affecting a laminar flow of a liquid flowing within said hollow tubing whereby a maximum flow velocity of the laminar flow is located substantially midway between said stationary surface and said inner wall portion.~~

2. (currently amended) The liquid cooler of claim 1, wherein said ~~first~~ structure comprises a baffle wire, said baffle wire having a straight wire region interposed between each two adjacent of at least two kink regions, each of said at least two kink regions having a lobe region abutting said ~~circular~~ inner wall portion, wherein said lobe regions serve to locate said straight wire region along said center portion.

3. (original) The liquid cooler of claim 2, wherein the length of each of said straight wire regions is equal.

4. (original) The liquid cooler of claim 2, wherein at least two of said at least two kink regions are used to locate said straight wire region within said center portion.

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5. (currently amended) The liquid cooler of claim 4, wherein at least one of said at least two ~~kind kink~~ regions is not co-planar with respect to another of said at least two kink regions.

6. (withdrawn) ~~The liquid cooler of claim 1, wherein said first structure is an elongated ridge member secured to said circular inner wall portion of said hollow tubing.~~

7. (withdrawn) ~~The cooling system of claim 6, wherein said elongated ridge member comprises an aluminum alloy elongated ridge member.~~

8. (currently amended) A cooling system comprising:

a first component selected from the group consisting of a vehicle component and a system component; and

a liquid cooler coupled to said first component, said liquid cooler comprising a hollow tubing having an outer wall and a hollow inner portion, and a first structure, wherein said first structure is contained within a wall of said hollow tubing and functions to limit the temperature rise of along said wall by distorting the laminar flow of a liquid flowing through a center portion of said hollow circular inner portion, said center portion defined by a reference line located equidistant within a circular inner wall portion of said wall. disposed along a center portion within said hollow tubing, said structure providing a stationary surface for affecting a laminar flow of a liquid flowing within said hollow tubing whereby a maximum flow velocity of the laminar flow is located substantially midway between said stationary surface and said inner wall portion.

9. (currently amended) The cooling system of claim 8, wherein said first structure comprises a baffle wire, said baffle wire having a straight wire region interposed between each two adjacent of at least two kink regions, each of said at least two ~~kind kink~~ regions having a lobe region abutting said ~~circular~~ inner wall portion, wherein said lobe regions serve to locate said straight wire region along said center portion.

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10. (withdrawn) ~~The cooling system of claim 8, wherein said first structure is an elongated ridge member having a pair of end regions and a middle portion, wherein said pair of end regions are secured at a first location on said circular inner wall portion and wherein said middle portion extends to said center portion.~~

11. (withdrawn) ~~The cooling system of claim 10, wherein said liquid cooler has a thermal interface portion, said thermal interface portion being coupled to said outer wall at a position nearest to said first location and being coupled to said first component.~~

12. (withdrawn) ~~The cooling system of claim 11, wherein a layer of a first substance is placed between said thermal interface plate and said first component, said first substance capable of enhancing the heat transfer capabilities between said first component and said liquid cooler, wherein said first substance is selected from the group consisting of a thermal grease, a thermal adhesive, and a film interposer.~~

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13. (currently amended) The cooling system of claim 8, wherein said vehicle component is an electronic control module.

14. (original) The cooling system of claim 8, wherein said liquid is selected from the group consisting of diesel fuel, gasoline, water-mix engine coolant, and motor oil.

15. (currently amended) A method for improving the cooling capabilities of a liquid cooler coupled to a vehicle or system component having a hollow tubing having an outer wall and a hollow inner portion, the method comprising the steps step of:

decreasing the temperature rise along an outer surface of a hollow tubing resulting from the laminar flow of a liquid through said hollow tubing;

providing a laminar flow of a liquid through the hollow tubing; and

shifting the laminar flow of the liquid so that a maximum velocity of the laminar flow is located substantially midway between a center portion and the outer wall of the hollow tubing, whereby a rise in temperature along an outer surface of the outer wall decreases.

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16. (cancelled)

17. (currently amended) The method of claim 16-15, wherein the step of distorting shifting the laminar flow of a liquid flowing through a center portion of a hollow tubing comprises the step of introducing providing a first structure within a the hollow tubing of the liquid cooler, said first the structure used to distort shifting the laminar flow of a liquid flowing through a center portion of said hollow tubing.

18. (currently amended) The method of claim 16-15, wherein the step of distorting shifting the laminar flow of a liquid flowing through a center portion of a hollow tubing comprises the step of providing introducing a first structure within said the hollow tubing of the liquid cooler, said first the structure used to distort shifting the laminar flow of a liquid flowing through a center portion of said hollow tubing and to increase increasing the a surface area within said the hollow tubing.

19. (currently amended) The method of claim 17, wherein the step of introducing providing a first structure comprises the step of introducing a first structure comprises the step of introducing providing a baffle wire within said the hollow tubing of the liquid cooler, said the baffle wire having a straight wire region interposed between each two adjacent of at least two kink regions, each of said the at least two kink regions having a lobe region abutting said circular the inner wall portion, wherein said the lobe regions serve to locate said the straight wire region along said the center portion, wherein said the straight wire region shifts the laminar flow of a liquid flowing through said center portion of said hollow tubing.

20. (withdrawn) The method of claim 18, wherein the step of introducing a first structure comprises the step of introducing an elongated ridge member to a first location on a circular inner wall portion of said hollow tubing, wherein said elongated ridge member has a pair of end regions secured at said first location and a middle portion extending to said center portion, wherein said first location is in closest proximity with a thermal interface portion of said liquid cooler.